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Dominion

April 14, 2008

Attn: Document Control Desk
U. S. Nuclear Regulatory Commission
Washington, DC 20555

Serial No. 07-0288
LIC/RB/R0
Docket No: 50-305
License No: DPR-43

DOMINION ENERGY KEWAUNEE, INC.
KEWAUNEE POWER STATION
LICENSE AMENDMENT REQUEST - 224
STEAM LINE ISOLATION FUNCTION APPLICABILITY

Pursuant to 10 CFR 50.90, Dominion Energy Kewaunee, Inc. (DEK) requests an amendment to Facility Operating License Number DPR-43 for Kewaunee Power Station (KPS). The proposed amendment would add a new footnote to Kewaunee Technical Specification (TS) Table TS 3.5-4, "Instrument Operating Conditions for Isolation Functions." The new footnote would be applicable to KPS TS Table TS 3.5-4, Items 2a, 2b, 2c and 2d that apply to the main steam line isolation (SLI) actuation circuitry.

Specifically, the new footnote would allow the main steam line isolation circuitry to be inoperable when both Main Steam Isolation Valves (MSIVs) are closed and de-activated. The addition of the proposed footnote is considered acceptable because the SLI function is already accomplished when both MSIVs are closed. By requiring the MSIVs to be de-activated, additional assurance is provided that the valve will remain closed.

Attachment 1 to this letter contains a description, a safety evaluation, a significant hazards determination, and environmental considerations for the proposed amendment. Attachment 2 contains the marked-up Technical Specifications (TS) page. Attachment 3 contains marked-up TS Bases pages and is provided for information only.

The KPS Plant Operations Review Committee has approved this proposed change and a copy of this submittal has been provided to the State of Wisconsin in accordance with 10 CFR 50.91(b).

DEK requests approval of the proposed amendment by March 31, 2009. Once approved, the amendment will be implemented within 60 days.

If you have any questions or require additional information, please contact Mr. Gerald Riste at (920) 388-8424.

Very truly yours,

Gerald T. Bischof
Vice President – Nuclear Engineering

COMMONWEALTH OF VIRGINIA)
)
COUNTY OF HENRICO)

The foregoing document was acknowledged before me, in and for the County and Commonwealth aforesaid, today by Gerald T. Bischof, who is Vice President-Nuclear Engineering of Dominion Energy Kewaunee, Inc. He has affirmed before me that he is duly authorized to execute and file the foregoing document in behalf of that Company, and the statements in the document are true to the best of his knowledge and belief.

Acknowledged before me this 14th day of April, 2008.

My Commission expires: August 31, 2008.

MARGARET B. BENNETT
Notary Public 354302
Commonwealth of Virginia
My Commission Expires Aug 31, 2008

Margaret B. Bennett
Notary Public

Attachments:

1. Discussion of Change, Safety Evaluation, Significant Hazards Determination, and Environmental Considerations
2. Marked-up TS Page
3. Marked-up TS Bases Pages

Commitments made in this letter: None

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ATTACHMENT 1

LICENSE AMENDMENT REQUEST - 224

STEAM LINE ISOLATION FUNCTION APPLICABILITY

DISCUSSION OF CHANGE, SAFETY EVALUATION, SIGNIFICANT HAZARDS DETERMINATION, AND ENVIRONMENTAL CONSIDERATIONS

KEWAUNEE POWER STATION

DOMINION ENERGY KEWAUNEE, INC.

KEWAUNEE POWER STATION - LAR 224
"STEAM LINE ISOLATION FUNCTION APPLICABILITY"

INTRODUCTION

Pursuant to 10 CFR 50.90, Dominion Energy Kewaunee, Inc. (DEK) requests an amendment to the Kewaunee Power Station (KPS) Facility Operating License DPR-43. The proposed amendment would revise KPS Technical Specification (TS) Table TS 3.5-4, "Instrument Operating Conditions for Isolation Functions," by inserting a new footnote. The footnote would permit the number of operable steam line isolation (SLI) channels to be zero when both Main Steam Isolation Valves MSIVs are closed and de-activated.

During low steam flow conditions at KPS, trip relays for the Hi Steam Flow reactor trip logic are subject to repeated cycling. This condition has led to premature relay degradation. The proposed amendment would allow DEK to reduce the potential for Hi Steam Flow bistable output relay failure induced by repeated cycling.

The proposed amendment is consistent with Improved Standard Technical Specifications NUREG-1431, Revision 3, (ISTS) Table 3.3.2-1, "Engineered Safety Feature Actuation System Instrumentation."

1.0 DESCRIPTION

The proposed amendment would add a footnote to KPS TS Table TS 3.5-4, Functional Unit 2, "Steam Line Isolation." The new footnote would allow the SLI channels to be inoperable when both MSIVs are closed and de-activated.

The purpose of the SLI instrumentation is to close one or both MSIVs when specific plant parameter values are exceeded. The addition of this footnote would allow the SLI instrument channels, which act to close one or both MSIVs, to be inoperable when both MSIVs are closed and de-activated. This change is consistent with ISTS.

2.0 PROPOSED CHANGE

The proposed amendment would add footnote 3 to KPS TS Table TS 3.5-4, page 1, which states, "Steam Line Isolation channels are not required to be operable when both main steam isolation valves are closed and de-activated." In addition, the following items in TS Table TS 3.5-4, page 1, Column 3, "Minimum Operable Channels," would be annotated to refer the reviewer to proposed new footnote 3:

- 2a Hi-Hi Steam Flow with Safety Injection
- 2b Hi Steam Flow and 2 of 4 Lo-Lo T_{avg} with Safety Injection

- 2c Hi-Hi Containment Pressure
- 2d Manual

The associated KPS TS 3.5, "Instrument System," Bases pages that describe the SLI functions will also be changed, and are included in Attachment 3 for information.

3.0 BACKGROUND

DEK requests a change to KPS TS Table TS 3.5-4, "Instrument Operating Conditions for Isolation Functions." Specifically, the change would affect the minimum operable channels requirements for the steam line isolation function.

The KPS main steam system conducts steam through a 30-inch pipe from each of the two steam generators within the reactor containment through a swing-disc type main steam isolation valve (MSIV) and a swing-disc type non-return valve to the turbine stop and control valves (refer to KPS USAR Figure 10.2-1, "Flow Diagram – Main, Auxiliary Steam and Steam Dump," for a flow diagram of the system). The main steam isolation and non-return valves are located outside of the containment with the two steam lines interconnected near the turbine. A steam flow element is provided inside containment in the line from each steam generator, upstream of the isolation and non-return valves, to meter steam flow from each steam generator. Each steam flow element provides an input signal to the steam line isolation (SLI) circuitry and the automatic feedwater flow control system.

Each MSIV contains a swing-disc, which is normally held out of the main steam flow path by an air piston. The valves are closed by steam flow (aided by a spring) upon receipt of a signal from the steam line isolation protection system as described in KPS USAR Section 7, "Instrumentation and Controls." Air is routed to the air pistons by solenoid valves that energize to isolate the supply air to the air pistons. Air is vented from the air pistons, allowing the swing disc to close by steam flow (aided by a spring).

Isolation of the main steam lines provides protection in the event of a steam line break (SLB) inside or outside containment. Rapid isolation of the steam lines will limit the SLB accident to the blowdown from one SG, at most. For a SLB upstream of the MSIVs, closure of the MSIVs limits the accident to the blowdown from only the affected SG. For a SLB downstream of both MSIVs, closure of the MSIVs terminates the accident as soon as the steam lines depressurize without blowdown of either SG.

The swing disc type non-return valves prevent reverse flow of steam. If a SLB occurs between a non-return valve and a steam generator, the affected steam generator will blow down. The non-return valve in the line will eliminate blowdown (reverse flow) from the other steam generator. The steam line break accident is analyzed in KPS USAR Section 14.2.5.

The logic diagram for the SLI function is shown in KPS USAR Figure 7.5-1, "Engineered Safety Feature Logic Diagram." The Engineered Safety Features (ESF) actuation circuits for the SLI function are designed on the principle of the safeguard bistables (see USAR Figure 7.5-2, "Engineered Safety Features Actuation Circuits") de-energizing to actuate their associated safety function.

The ESF actuation system automatically initiates the SLI function as noted (i.e. closes one or both MSIVs) for the following conditions:

1. Coincidence of a safety injection signal and (1/2) high steam flow (Hi-Hi setpoint) isolates the faulty steam line (train specific);
2. Coincidence of a safety injection signal and (2/4) Lo-Lo T_{avg} and (1/2) high steam flow (Hi setpoint) isolates the faulty steam line (train specific);
3. High containment pressure (2/3) (Hi-Hi setpoint) isolates both steam lines.

Per the current KPS TS Table TS 3.5-4, the SLI instrumentation must be operable and capable of manual or automatic initiation when the plant is in the OPERATING, HOT STANDBY, HOT SHUTDOWN, or INTERMEDIATE SHUTDOWN modes. With the MSIV's open in these operating modes, a SLB could result in the release of significant quantities of energy and cause a cool-down of the primary system. The proposed amendment would allow the SLI function to be inoperable when both MSIVs are closed and de-activated because, in this plant configuration, the SLI function has already been accomplished.

4.0 TECHNICAL ANALYSIS

4.1 Proposed Change Synopsis

The addition of proposed footnote 3 to Table TS 3.5-4, page 1 of 2, would permit the SLI instrumentation to be inoperable when both MSIVs are closed and de-activated. When closed, the MSIVs have fulfilled their intended safety function and the actuation function of SLI is not required. By de-activating both MSIVs there is added assurance that the MSIV's will remain closed.

SLI instrumentation provides a signal to close the MSIVs, which mitigates the consequences of a postulated SLB inside or outside containment. Rapid isolation of the main steam lines will limit the consequences of an SLB accident. For an SLB upstream of either MSIV, closure of the non-return valves limits the accident to the blowdown from only the affected SG. For a SLB downstream of the MSIVs, closure of the MSIVs terminates the accident as soon as the steam lines depressurize, without blowdown of either SG. The KPS steam line break accident analysis neglects the non-return valves and conservatively assumes blowdown of both steam generators up to the time of MSIV closure.

The steam line isolation function (manual and automatic) currently must be operable in the OPERATING, HOT STANDBY, HOT SHUTDOWN and INTERMEDIATE SHUTDOWN modes. When the plant is in these modes and the MSIV's are open, a SLB could result in the release of significant quantities of energy and cause a cooldown of the primary system.

With incorporation of the proposed amendment, the SLI function would continue to be required in the OPERATING, HOT STANDBY, HOT SHUTDOWN and INTERMEDIATE SHUTDOWN modes unless both MSIVs are closed and de-activated. When the MSIVs are closed and de-activated, they are in their safe configuration and are providing the required safety related function to mitigate a potential SLB event. With the MSIVs closed and de-activated, any steam generated by the SG's can be diverted to the atmosphere.

In the REFUELING and COLD SHUTDOWN modes, the SLI function is not currently required to be operable because there is insufficient energy in the RCS and SGs to result in a SLB releasing significant quantities of energy and causing a cooldown of the primary system.

4.2 Safety Impact of Proposed Change On The Current TS

KPS TS 3.5.c currently requires that if the minimum number of channels for a particular in-service subsystem falls below the limits of Column 3 of Table TS 3.5-4, or if the values in Column 4 cannot be achieved; operation shall be limited according to the requirement provided in Column 6 as soon as practicable. Thus, per TS Table TS 3.5-4, if the minimum number of channels for SLI function 2a, 2b, 2c, or 2d falls below the limit in Column 3, the plant must be placed in HOT SHUTDOWN as soon as practicable. KPS TS Table TS 3.5-4, footnote 1 states that if minimum conditions are not met within 24 hours, steps shall be taken to place the plant in a COLD SHUTDOWN condition. The proposed amendment would add a new footnote that permits the minimum number of channels requirement in Column 3 to not be met for the SLI function, provided both MSIVs are closed and de-activated.

KPS TS Table TS 3.5-4, as amended by the proposed new footnote, would be less restrictive than the current TS Table TS 3.5-4. However, the safety function provided by the SLI instrumentation would not be adversely affected by the proposed change. When both MSIVs are closed and de-activated, the safety function of the SLI instrumentation has been accomplished. De-activating the MSIVs provides added assurance the MSIVs will remain closed. Therefore, KPS TS Table TS 3.5-4, as amended by the proposed change, would not diminish the safety function of the SLI instrumentation.

4.3 Comparison of KPS TS Table TS 3.5-4 and NUREG 1431 Table 3.3.2-1

NUREG 1431, Table 3.3.2-1, "Engineered Safety Feature Actuation System Instrumentation," page 4 of 8, Function 4, "Steam Line Isolation," contains prescribed conditions and associated actions to be taken when ESF actuation channels become inoperable. Table 3.3.2-1, Function 4 contains a footnote (h) which applies to Modes 2 and 3 and contains the wording, "Except when all MSIVs are closed and [de-activated]."

The proposed amendment would revise KPS TS Table TS 3.5-4 to include a new footnote, worded as follows; "Steam Line Isolation channels are not required to be operable when both MSIVs are closed and de-activated." Thus, the proposed change to KPS TS Table TS 3.5-4, Functional Unit 2, "Steam Line Isolation" is consistent with NUREG 1431, Table 3.3.2-1, footnote (h).

4.4 Minimizing SLI Relay Cycling During Low Power Operations

The basic arrangement of components that comprise a representative analog protection channel is shown in USAR Figure 7.2-3, "Typical Channel Testing Arrangement." The components include a sensor or transmitter, power supply, bistable, bistable trip switch and proving lamp, test-operate switch, test annunciator, test signal injection jack, and test points.

Currently, during low- or no-steam flow conditions, the Main Steam Header High Steam Flow trip relays chatter. Chattering is physical cycling of the relay. It is caused by the instrument loop for the steam flow instrument due to instrument noise during low- or no-steam flow conditions. This cycling of the trip relays at low- or no-steam flow conditions causes premature relay degradation and represents a challenge to equipment reliability.

The proposed amendment would serve to reduce the potential for trip relay degradation or failure by allowing the high steam flow bistables to be defeated when both MSIVs are closed and de-activated.

5.0 REGULATORY SAFETY ANALYSIS

5.1 No Significant Hazards Consideration

Dominion Energy Kewaunee, Inc. (DEK) proposes to amend Operating License DPR-43 for the Kewaunee Power Station (KPS). Specifically, the proposed amendment would revise KPS TS Table TS 3.5-4, page 1, to add a footnote 3, applicable only to the "Steam Line Isolation" function. The purpose of the steam line isolation (SLI) function is to close the MSIVs when specific plant conditions exist as described in Section 3. The addition of this footnote will allow the SLI instrument channels, which act to close one or both MSIVs, to be inoperable when both MSIVs are closed and de-activated.

DEK has evaluated whether or not a significant hazards is involved with the proposed amendment(s) by focusing on the three standards set forth in 10 CFR 50.92(c), "Issuance of Amendment," as discussed below:

1. **Does the proposed amendment involve a significant increase in the probability or consequences of an accident previously evaluated?**

   Response: No.

   The proposed amendment would allow the SLI instrumentation to be inoperable when both MSIVs are already closed and de-activated. When both MSIVs are closed, the SLI function is already accomplished and the SLI instrumentation is no longer needed. The proposed amendment does not involve a physical alteration of the plant or a functional change in the methods used to respond to any evaluated plant accident. The isolation function is accomplished either by SLI instrumentation or manually closing the MSIVs. No new or different equipment is being installed and no installed equipment is being removed or modified. The proposed amendment would not alter the parameters within which the plant is normally operated or the setpoints which initiate protective or mitigative actions.

   With both MSIVs closed, the SLI instrumentation is not required to be operable since its safety function has already been accomplished. Addition of the proposed new footnote would not adversely impact any of the previously evaluated accidents described in the KPS USAR.

   Therefore, the proposed amendment does not involve a significant increase in the probability or consequences of an accident previously evaluated.

2. **Does the proposed amendment create the possibility of a new or different kind of accident from any accident previously evaluated?**

   Response: No.

   The proposed amendment does not involve a physical alteration of the plant or a functional change in the methods used to respond to plant accidents or transients. No new or different equipment is being installed and no installed equipment is being removed or modified. The proposed amendment would not alter the parameters within which the plant is normally operated or the setpoints which initiate protective or mitigative actions. The design function of the SLI instrumentation would not be changed. With both MSIVs closed, the safety function associated with the SLI instrumentation has already been accomplished. Allowing the SLI instrumentation to be inoperable when both MSIVs are closed and de-activated does not functionally impact how the plant would respond to

any previously evaluated accidents. No new failure mechanisms, malfunctions, or accident initiators not considered in the design and licensing bases are introduced by the proposed amendment.

Therefore, the proposed change does not create the possibility of a new or different kind of accident from any previously evaluated.

3. Does the proposed amendment involve a significant reduction in a margin of safety?

Response: No.

Margin of safety is established through the design of the systems, structures, and components, the parameters within which the plant is operated, and the establishment of setpoints for the actuation of equipment relied upon to respond to an event. The proposed TS amendment does not adversely impact any plant structure, system or component that is relied upon for accident mitigation. The design of the SLI function is not affected by the proposed change. Closure and de-activation of the MSIVs represents an increase in functional margin as a deactivated valve has no opportunity to be inadvertently opened. The proposed amendment also does not adversely affect the setpoints or parameters under which the SLI instrumentation is operated. Station operations and the SLI function would not be adversely affected by the proposed change, because the isolation function capability is maintained throughout the applicable modes of operation. The proposed change does not alter any design basis or safety limit established in the KPS USAR.

Therefore, the proposed amendment to the KPS TS does not involve a significant reduction in a margin of safety.

Based on the above, DEK concludes that the proposed amendment presents no significant hazard under the standards set forth in 10 CFR 50.92(c), and, accordingly, a finding of "no significant hazards consideration" is justified.

5.2 Applicable Regulatory Requirements/Criteria

The US Atomic Energy Commission (AEC) issued their Safety Evaluation (SE) for the Kewaunee Power Station (KPS) on July 24, 1972 with supplements dated December 18, 1972 and May 10, 1973. The AEC's SE, Section 3.1, "Conformance with AEC General Design Criteria," described the conclusions the AEC reached associated with the General Design Criteria in effect at the time. The AEC stated:

"The Kewaunee plant was designed and constructed to meet the intent of the AEC's General Design Criteria, as originally proposed in July 1967. Construction of the plant was about 50% complete and the Final Safety Analysis Report (Amendment

No. 7) had been filed with the Commission before publication of the revised General Design Criteria in February 1971 and the present version of the criteria in July 1971. As a result, we did not require the applicant to reanalyze the plant or resubmit the FSAR. However, our technical review did assess the plant against the General Design Criteria now in effect and we are satisfied that the plant design generally conforms to the intent of these criteria."

As such, the appropriate General Design Criteria from the Final Safety Analysis Report (Amendment 7), which has been updated and is now titled the Updated Safety Analysis Report (USAR), are listed below.

General Design Criteria (GDC)

Criterion 15

Protection systems shall be provided for sensing accident situations and initiating the operation of necessary engineered safety features.

Evaluation

The facility is provided with adequate instrumentation and controls to sense accident situations and initiate the operation of necessary engineered safety features systems.

Criterion 19

Protection systems shall be designed for high functional reliability and in-service testability necessary to avoid undue risk to the health and safety of the public.

Evaluation

All protection systems are designed for the utmost in reliability based on extensive testing in the shop and many years of actual operating experience. Sufficient redundancy of such systems is provided to enable test of instrumentation channels during plant operation without jeopardizing reactor safety.

Criterion 20

Redundancy and independence designed into protection systems shall be sufficient to assure that no single failure or removal from service of any component or channel of such a system will result in loss of the protection function. The redundancy provided shall include, as a minimum, two channels of protection for each protection function to be served.

Evaluation

Sufficient redundancy and independence is designed into the protection systems to assure that no single failure or removal from service of any component or channel results in loss of protection function. In addition, the "Proposed IEEE Criteria for Nuclear Power Plant Protection Systems" of the Institute of Electrical and Electronic Engineers, IEEE No. 279, August 30, 1968, was employed in the detailed design of the protection systems.

Criterion 23

The effects if adverse conditions to which redundant channels or protection systems might be exposed in common, either under normal conditions or those of an accident, shall not result in loss of the protection function or shall be tolerable on some other basis.

Evaluation

Protection system components are designed and arranged so that the mechanical and thermal environment accompanying any emergency situation in which the components are required to function does not interfere with the function.

Criterion 25

Means shall be included for suitable testing of the active components of protection systems while the reactor is in operation to determine if failure or loss of redundancy has occurred.

Evaluation

Each protection channel in service at power is capable of being calibrated and tested at power to verify its operation. Details of the means used to test protection system instrumentation are included in KPS USAR Section 7.

Criterion 26:

The protection systems shall be designed to fail into a safe state or into a state established as tolerable on a defined basis. If conditions such as disconnection of the system, loss of energy (e.g., electrical power, instrument air), or adverse environments (e.g., extreme heat or cold, fire, steam, or water) are experienced.

Evaluation

The details of the design and failure modes of the various protection channels are to be found in portions of KPS USAR Section 7 concerned with those channels.

This proposed amendment does not affect the design criteria listed above.

5.3 Conclusion

In conclusion, based on the considerations discussed above,

(1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner,

(2) such activities will be conducted in compliance with the Commission's regulations, and

(3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

6.0 ENVIRONMENTAL CONSIDERATION

A review has determined that the proposed amendment would change a requirement with respect to installation or use of a facility component located within the restricted area, as defined in 10 CFR 20, or would change an inspection or surveillance requirement. However, the proposed amendment does not involve (i) a significant hazards consideration, (ii) a significant change in the types or significant increase in the amounts of any effluent that may be released offsite, or (iii) a significant increase in individual or cumulative occupational radiation exposure. Accordingly, the proposed amendment meets the eligibility criterion for categorical exclusion set forth in 10 CFR 51.22(c)(9). Therefore, pursuant to 10 CFR 51.22(b), no environmental impact statement, or environmental assessment need be prepared in connection with the proposed amendment.

7.0 REFERENCES

1. NUREG-1431 "Standard Technical Specifications Westinghouse Plants," Revision 3.

ATTACHMENT 2

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STEAM LINE ISOLATION FUNCTION APPLICABILITY

MARKED-UP TS PAGES:

TABLE TS 3.5-4, PAGE 1
TABLE TS 3.5-4, PAGE 2

KEWAUNEE POWER STATION

DOMINION ENERGY KEWAUNEE, INC.

TABLE TS 3.5-4

INSTRUMENT OPERATING CONDITIONS FOR ISOLATION FUNCTIONS

		1	2	3	4	5	6
NO.	**FUNCTIONAL UNIT**	**NO. OF CHANNELS**	**NO. OF CHANNELS TO TRIP**	**MINIMUM OPERABLE CHANNELS**	**MINIMUM DEGREE OF REDUNDANCY**	**PERMISSIBLE BYPASS CONDITIONS**	**OPERATOR ACTION IF CONDITIONS OF COLUMN 3 OR 4 CANNOT BE MET**
1	Containment Isolation						
	a. Safety Injection	Refer to Item No. 1 of Table TS 3.5-3					HOT SHUTDOWN(1)
	b. Manual	2	1	1	-		HOT SHUTDOWN
2	Steam Line Isolation						
	a. Hi-Hi Steam Flow with Safety Injection	2/loop	1	1(3)	-		HOT SHUTDOWN(1)
	b. Hi Steam Flow and 2 of 4 Lo-Lo T_{avg} with Safety Injection	2/loop	1	1(3)	-		HOT SHUTDOWN(1)
	c. Hi-Hi Containment Pressure	3	2	2(3)	-		HOT SHUTDOWN(1)
	d. Manual	1/loop	1/loop	1/loop(3)	-		HOT SHUTDOWN

(1) If minimum conditions are not met within 24 hours, steps shall be taken to place the plant in a COLD SHUTDOWN condition.
(3) Steam Line Isolation channels are not required to be operable when both main steam isolation valves are closed and de-activated.

LAR 224

TABLE TS 3.5-4

INSTRUMENT OPERATING CONDITIONS FOR ISOLATION FUNCTIONS

		1	2	3	4	5	6
NO.	**FUNCTIONAL UNIT**	**NO. OF CHANNELS**	**NO. OF CHANNELS TO TRIP**	**MINIMUM OPERABLE CHANNELS**	**MINIMUM DEGREE OF REDUNDANCY**	**PERMISSIBLE BYPASS CONDITIONS**	**OPERATOR ACTION IF CONDITIONS OF COLUMN 3 OR 4 CANNOT BE MET**
3	Containment Ventilation Isolation						
	a. High Containment Radiation	2	1	1	-	-	These channels are not required to activate containment ventilation isolation when the containment purge and ventilation system isolation valves are maintained closed.[2]
	b. Safety Injection	Refer to Item 1 of Table TS 3.5-3					
	c. Containment Spray	Refer to Item 3 of Table TS 3.5-3					
4	Main Feedwater Isolation						
	a. Hi-Hi Steam Generator Level	3	2	2	1		HOT SHUTDOWN

[2] The detectors are required for Reactor Coolant System leak detection as referenced in TS 3.1.d.5.

ATTACHMENT 3

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STEAM LINE ISOLATION FUNCTION APPLICABILITY

MARKED-UP TS BASES PAGES:

TS B3.5-2
TS B3.5-3
TS B3.5-4

KEWAUNEE POWER STATION

DOMINION ENERGY KEWAUNEE, INC.

BASIS - Instrumentation System (TS 3.5)

Instrumentation has been provided to sense accident conditions and to initiate operation of the engineered safety features.[1] Section 2.3 of these specifications describes the LIMITING SAFETY SYSTEM SETTINGS for the protective instrumentation.

Safety Injection

Safety Injection can be activated automatically or manually to provide additional water to the Reactor Coolant System or to increase the concentration of boron in the coolant.

Safety Injection is initiated automatically by (1) low pressurizer pressure, (2) low main steam line pressure in either loop and (3) high containment pressure. Protection against a loss-of-coolant accident is primarily through signals (1) and (3). Protection against a steam line break is primarily by means of signal (2).

Manual actuation is always possible. Safety Injection signals can be blocked during those OPERATING MODES where they are not "required" for safety and where their presence might inhibit operating flexibility; they are generally restored automatically on return to the "required" OPERATING MODE.

Reactor Trip Breakers

With the addition of the automatic actuation of the shunt trip attachment, diverse features exist to effect a reactor trip for each reactor trip breaker. Since either trip feature being OPERABLE would initiate a reactor trip on demand, the flexibility is provided to allow plant operation on a reactor trip breaker (with either trip feature inoperable) for up to 72 hours. This specification also requires the plant to proceed to the HOT SHUTDOWN condition in accordance with the Kewaunee STANDARD SHUTDOWN SEQUENCE if a reactor trip breaker is bypassed for greater than 8 hours.

Containment Spray

Containment sprays are also actuated by a high containment pressure signal (Hi-Hi) to reduce containment pressure in the event of a loss-of-coolant or steam line break accident inside the containment.

The containment sprays are actuated at a higher containment pressure (approximately 50% of design containment pressure) than is Safety Injection (10% of design). Since spurious actuation of containment spray is to be avoided, it is initiated only on coincidence of high containment pressure (Hi-Hi) sensed by three sets of one-out-of-two containment pressure signals provided for its actuation.

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[1] USAR Section 7.5

Containment Isolation

A containment isolation signal is initiated by any signal causing automatic initiation of Safety Injection or may be initiated manually. The containment isolation system provides the means of isolating the various pipes passing through the containment walls as required to prevent the release of radioactivity to the outside environment in the event of a loss-of-coolant accident.

Steam Line Isolation

In the event of a steam line break, the steam line isolation valve of the affected line is automatically isolated to prevent continuous, uncontrolled steam release from more than one steam generator. The steam lines are isolated on Hi-Hi containment pressure or high steam flow in coincidence with Lo-Lo T_{avg} and Safety Injection or Hi-Hi steam flow in coincidence with Safety Injection. Adequate protection is afforded for breaks inside or outside the containment even under the assumption that the steam line check valves do not function properly.

Isolation Functions

a. Steam Line Isolation - High High Steam Flow Coincident With Safety Injection

This Function provides closure of the MSIVs during a steam line break (or inadvertent opening of a relief or safety valve) to maintain at least one non-faulted SG as a heat sink for the reactor, and to limit the mass and energy release to containment.

Two steam flow channels per steam line (loop) are provided. One steam line flow channel per steam line (loop) is required to be OPERABLE for this Function. The two steam flow channels per loop are combined in a one-out-of-two logic to indicate high steam flow in one steam line. The steam flow transmitters provide control inputs, but the control function cannot cause the events that the Function must protect against. Therefore, two channels are sufficient to satisfy redundancy requirements.

The High-High Steam Flow Setting Limit (TS Table 3.5-1) is a delta pressure (ΔP), corresponding to approximately 120% of full steam flow at full load steam pressure.

The main steam lines isolate only if the high high steam flow signal occurs coincident with an SI signal. The Main Steam Line Isolation Function requirements for the SI Functions are the same as stated in TS Table 3.5.3. Therefore, the requirements are not repeated in Table 3.5-4.

This Function must be OPERABLE in the OPERATING, HOT STANDBY, HOT SHUTDOWN, and INTERMEDIATE SHUTDOWN modes when a secondary side break or stuck open valve could result in rapid depressurization of the steam lines, unless all MSIVs are closed and de-activated, in which case, the Steam Line Isolation channels are not required to be operable. This Function is not required to be OPERABLE in the COLD SHUTDOWN or REFUELING modes because there is insufficient energy in the secondary side of the unit to have an accident.

b. Steam Line Isolation - High Steam Flow Coincident With Safety Injection and Coincident With Tavg - Low Low

This Function provides closure of the MSIVs during an SLB or inadvertent opening of an SG relief or safety valve to maintain at least one non-faulted SG as a heat sink for the reactor, and to limit the mass and energy release to containment.

Two steam line flow channels per steam line (loop) are provided. One steam line flow channels per steam line (loop) is required OPERABLE for this Function. The two steam flow channels are combined in a one-out-of-two logic to indicate high steam flow in one steam line. The steam flow transmitters provide control inputs, but the control function cannot cause the events that the function must protect against. Therefore, two channels are sufficient to satisfy redundancy requirements. The one-out-of-two configuration allows online testing because trip of one high steam flow channel is not sufficient to cause initiation.

The High Steam Flow Setting Limit (TS Table 3.5-1) is a ΔP corresponding to approximately 20% of full steam flow at no load steam pressure.

The main steam line isolates only if the high steam flow signal occurs coincident with an SI and Lo-Lo RCS average temperature. The Main Steam Line Isolation Function requirements for the SI Functions are as stated in TS Table 3.5.3. Therefore, the requirements are not repeated in Table TS 3.5-4.

Two channels of Tavg per loop are provided. One channel of Tavg per loop is required to be OPERABLE. The Tavg channels are combined in a two-out-of-four logic, such that two channels tripped cause a trip for the parameter. The accidents that this Function protects against cause reduction of Tavg in the entire primary system. Therefore, the provision of two OPERABLE channels per loop in a two-out-of-four configuration ensures no single random failure disables the Tavg – Lo-Lo Function. The Tavg channels provide control inputs, but the control function cannot initiate events that the Function acts to mitigate. Therefore, additional channels are not required to address control protection interaction issues.

This Function must be OPERABLE in the OPERATING, HOT STANDBY, HOT SHUTDOWN, and INTERMEDIATE SHUTDOWN modes, when a secondary side break or stuck open valve could result in rapid depressurization of the steam lines, unless all MSIVs are closed and de-activated, in which case, the Steam Line Isolation channels are not required to be operable. This Function is not required to be OPERABLE in the COLD SHUTDOWN or REFUELING modes because there is insufficient energy in the secondary side of the unit to have an accident.

c. Steam Line Isolation – Hi-Hi Containment Pressure

This Function actuates closure of the MSIVs in the event of a LOCA or an SLB inside containment to maintain at least one non-faulted SG as a heat sink for the reactor, and to limit the mass and energy release to containment. The transmitters (d/p cells) are located outside containment with the sensing line (high pressure side of the transmitter) located inside containment. Hi-Hi Containment Pressure provides no input to any control functions. Thus, three OPERABLE channels are sufficient to satisfy protective requirements with two-out-of-three logic. The transmitters and electronics are located outside of containment.

Hi-Hi Containment Pressure must be OPERABLE in the OPERATING, HOT STANDBY, HOT SHUTDOWN, and INTERMEDIATE SHUTDOWN modes, when there is sufficient energy in the primary and secondary side to pressurize the containment following a pipe break. This would cause a significant increase in the containment pressure, thus allowing detection and closure of the MSIVs.

This Function must be OPERABLE in the OPERATING, HOT STANDBY, HOT SHUTDOWN, and INTERMEDIATE SHUTDOWN modes, when a secondary side break or stuck open valve

could result in rapid depressurization of the steam lines, unless all MSIVs are closed and de-activated, in which case, the Steam Line Isolation channels are not required to be operable. This Function is not required to be OPERABLE in the COLD SHUTDOWN and REFUELING modes because there is insufficient energy in the secondary side of the unit to have an accident.

d. Steam Line Isolation - Manual Initiation

Manual initiation of Steam Line Isolation can be accomplished from the control room. There are two switches in the control room (a Train A and a Train B switch). Depressing the Main Steam Isolation Initiation Train A or Train B pushbuttons isolates the respective trains MSIV. Depressing both Main Steam Isolation Initiation Initiate pushbuttons is required to immediately close both MSIVs. The specification requires one channel per loop to be OPERABLE when in the OPERATING or HOT STANDBY modes unless all MSIVs are closed and de-activated, in which case, the Steam Line Isolation channels are not required to be operable.

Main Feedwater Isolation

Main feedwater isolation actuation occurs as a result of a Hi-Hi steam generator water level to prevent steam generator overfill conditions. Steam generator overfill may result in damage to secondary components; for example, high moisture steam could erode the turbine blades at an accelerated rate.

Setting Limits

1. The high containment pressure limit is set at about 10% of the maximum internal pressure. Initiation of Safety Injection protects against loss-of-coolant[(2)] or steam line break[(3)] accidents as discussed in the safety analysis.

2. The Hi-Hi containment pressure limit is set at about 50% of the maximum internal containment pressure for initiation of containment spray and at about 40% for initiation of steam line isolation. Initiation of containment spray and steam line isolation protects against large loss-of-coolant or steam line break accidents as discussed in the safety analysis.

3. The pressurizer low-pressure limit is set substantially below system operating pressure limits. However, it is sufficiently high to protect against a loss-of-coolant accident as shown in the safety analysis.

[(2)] USAR Section 14.3
[(3)] USAR Section 14.2.5

4. The steam line low-pressure signal is lead/lag compensated and its setpoint is set well above the pressure expected in the event of a large steam line break accident as shown in the safety analysis.

5. The high steam line flow limit is set at approximately 20% of nominal full-load flow at the no-load pressure and the Hi-Hi steam line flow limit is set at approximately 120% of nominal full-load flow at the full-load pressure in order to protect against large steam line break accidents. The coincident Lo-Lo T_{avg} setting limit for steam line isolation initiation is set below its HOT SHUTDOWN value. The safety analysis shows that these settings provide protection in the event of a large steam line break.

6. The setpoints and associated ranges for the undervoltage relays have been established to always maintain motor voltages at or above 80% of their nameplate rating, to prevent prolonged operation of motors below 90% of their nameplate rating, and to prevent prolonged operation of 480 V MCC starter contactors at inrush currents.[4] All safeguard motors were designed to accelerate their loads to operating speed with 80% nameplate voltage, but not necessarily within their design temperature rise. Prolonged operation below 90% of nameplate voltage may result in shortening of motor insulation life, but short-term operation below 90% of nameplate voltage will not result in unacceptable effects due to the service factor provided in the motors and the conservative insulation system used on the motors. Prolonged operation of MCC contactors at inrush currents may result in blown control fuses and inoperable equipment; therefore operation will be limited to a time less than it takes for a fuse to blow.

   The primary safeguard buses undervoltage trip (85.0% of nominal bus voltage) is designed to protect against a loss of voltage to the safeguard bus and assures that safeguard protection action will proceed as assumed in the USAR. The associated time delay feature prevents inadvertent actuation of the undervoltage relays from voltage dips, while assuring that the diesel generators will reach full capacity before the Safety Injection pump loads are sequenced on.

   The safeguard buses second level undervoltage trip (93.6% nominal bus voltage) is designed to protect against prolonged operation below 90% of nameplate voltage of safeguard pumps. The time delay of less than 7.4 seconds ensures that engineered safeguards equipment operates within the time delay assumptions of the accident analyses. The time delay will prevent blown control fuses in 480 V MCC's; the MCC control fuses are the limiting component for long-term low voltage operation. The time delay is long enough to prevent inadvertent actuation of the second level UV relays from voltage dips due to large motor starts (except reactor

[4] USAR section 8.2.3

coolant pump starts with a safeguards bus below 3980 volts). Up to 7.4 seconds of operation of safeguard pumps between 80% and 90% of nameplate voltage is acceptable due to the service factor and conservative insulation designed into the motors.

Each relay in the undervoltage protection channels will fail safe and is alarmed to alert the operator to the failure.

A blackout signal which occurs during the sequence loading following a Safety Injection signal will result in a re-initiation of the sequence loading logic at time step 0 as long as the Safety Injection signal has not been reset. The Kewaunee Emergency Procedures warn the operators that a Blackout Signal occurring after reset of Safety Injection will not actuate the sequence loading and instructs to re-initiate Safety Injection if needed.

Instrument OPERATING Conditions

During plant OPERATIONS, the complete protective instrumentation systems will normally be in service. Reactor safety is provided by the Reactor Protection Systems, which automatically initiates appropriate action to prevent exceeding established limits. Safety is not compromised, however, by continuing OPERATION with certain instrumentation channels out of service since provisions were made for this in the plant design. This specification outlines LIMITING CONDITIONS FOR OPERATION necessary to preserve the effectiveness of the Reactor Control and PROTECTION SYSTEM when any one or more of the channels is out of service.

Almost all reactor protection channels are supplied with sufficient redundancy to provide the capability for CHANNEL CALIBRATION and test at power. Exceptions are backup channels such as reactor coolant pump breakers. The removal of one trip channel on process control equipment is accomplished by placing that channel bistable in a tripped mode; e.g., a two-out-of-three circuit becomes a one-out-of-two circuit. The source and intermediate range nuclear instrumentation system channels are not intentionally placed in a tripped mode since these are one-out-of-two trips, and the trips are therefore bypassed during testing. Testing does not trip the system unless a trip condition exists in another channel.

The OPERABILITY of the instrumentation noted in Table TS 3.5-6 assures that sufficient information is available on these selected plant parameters to aid the operator in identification of an accident and assessment of plant conditions during and following an accident. In the event the instrumentation noted in Table TS 3.5-6 is not OPERABLE, the operator is given instruction on compensatory actions.